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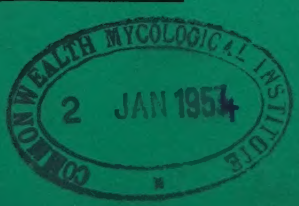
CONTENTS

	Page
Editorial : The Tariff "Increase"	9
Tunbridge Wells & Publicity : W.R.A.	10
"Long" Beds and Short Crops : W. S. Galbraith	11
Call-up Deferment	15
MUSHROOM RESEARCH TO CONTINUE	16
Who's Who : Dr. L. R. Kneebone	16
Mac's Mushroom Family	16
My Favourite Recipes—9 : Ambrose Heath	17
The Ventilation of Mushroom Houses : L. Gordon Davies ...	18
Workers' Wages	20
Off to the States	20
Building Limit Now £25,000	20
FIRST STEPS IN GROWING—I : McG. Bulloch	21
The Resistant Phorid	23
THE ATKINS ALPHABET—A : F. C. Atkins	24
Heather Farm Walk : W.R.A.	25
Mr. Middlebrook's Diary	29



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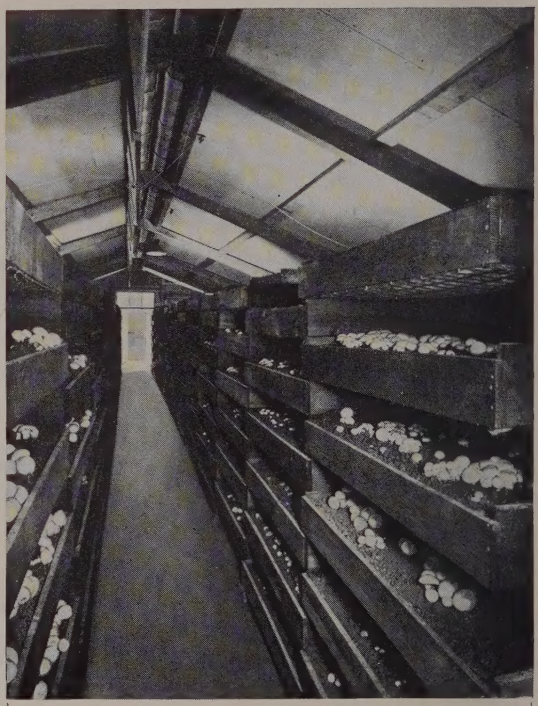

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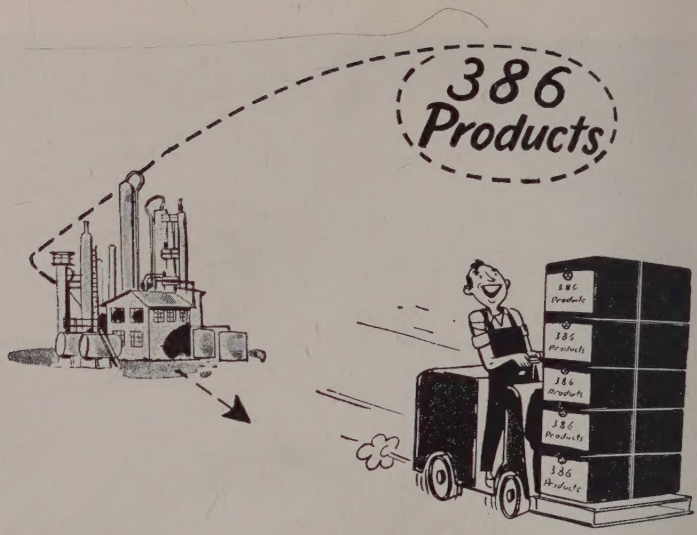

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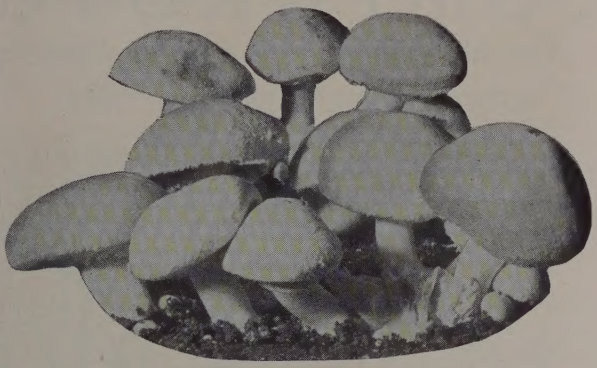

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The
MGA BULLETIN

JANUARY · 1954
NUMBER 49

EDITORIAL

THE TARIFF "INCREASE"

It was announced just a month ago that, as from 1st December, 1953, there would be a tariff increase on imported fresh mushrooms of 20 per cent. *ad valorem* for the period 1st October to 30th April, and of 10 per cent. general *ad valorem* (whatever " general " may mean in this context*) for the remaining five months of the year.

The continuance of *ad valorem* duties at all is a cause of irritation, for the NFU has pointed out time and again that they protect the industry least when the industry most needs protection. We had asked for a specific duty.

The only change from the previous tariff lies in the omission of the words " or 8d. per lb., whichever is the less." There is an " increase " only so long as our gross price during the October-April period is higher than 3/4d. per lb.

The average price during that period ending 30th April, 1953, was 4/2d. on the farm with which I am associated, and the new Duty, had it been operating then, would have been 10d., or 2d. higher than the figure regarded as reasonable in 1931, when our costs were a third of what they are to-day.

If the present trend in prices continues, as we all anticipate, the " increase " will promptly disappear and we shall be back where we were 23 years ago, so far as protection is concerned.

During the 10 per cent. period just ended, instead of 8d. lb., importers would have had to pay only 4d. had the " increase " been in operation.

Members of the MGA will be wise to urge the Executive to urge the NFU to urge the Government to get us a better deal than this. Mr. Eric Gardener, chairman of the NFU Central Horticultural Committee, has already informed the Trade Press: " If duties are found not to be sufficient the NFU can, and will, submit a further application."

Fred C. Atkins.

*Study of the White Paper (Cmd. 9018) suggests that the 10 per cent. general duty is the basic rate to be applied. The effect is almost to halve the 1931 duty. The same paper says there has been an adjustment of the period for special protection for mushrooms—yet it remains the same.

TUNBRIDGE WELLS AND PUBLICITY

Although these are early days as yet, arrangements for the 1954 A.G.M. and annual Mushroom Industry Exhibition are going forward and, at the November meeting of the Executive Committee, provisional arrangements were made to hold these gatherings at **Tunbridge Wells,** Kent.

The Committee discussed the matter to some length in the light of opinions expressed, not only by Association members, but by the Trade firms whose support and co-operation play such a large part in this annual effort. It was felt, not only by the Committee, but by the Trade that, as last year's show was held in the North a return to the South, this year, was quite in order. For the future, the Midlands as the venue is bound to be discussed and has already been suggested.

A new departure this year is the decision of the Executive to admit the general public on the second day of the Exhibition. Plans are, of necessity, in their very early stage but the suggested dates for the joint gathering are 28th and 29th September, with the Trade Exhibition and growers' competitions on the opening day, and the A.G.M. on the morning of the second day (29th) followed by the annual lunch and, in the afternoon, a " Brains Trust " of growers.

Many avenues are being explored with a view to making this 1954 venture the most successful yet held and the Secretary will be pleased to have the ideas of members and of the Trade as a whole.

Among other matters discussed by the Executive was the all important question of Publicity, with a report on the matter from Mr. Raymond Thompson, Chairman of the Publicity Sub-Committee. Mr. Thompson reported on early enquiries he had made regarding possible media for advertising mushrooms to the general public, among them, the holding of cooking demonstrations by Electricity and Gas Boards and the publishing of completely new sets of recipes, couched in everyday language and calculated thus to make a more general appeal to the average housewife. There were so many publicity ideas which needed exploring that these, with ideas submitted later by members, will be the subject of a special report in a later Bulletin. It was definitely decided however to take a stand in the NFU tent on the occasion of the Royal Agricultural Show at **Windsor** and Mr. Thompson promised to go thoroughly into the matter. The many thousands of people who visit this show each year should provide an excellent opportunity for publicising mushrooms.

Since that meeting the Association has been offered, free of charge, five feet of stand frontage (depth ten feet) by the Bradford Fertiliser Co., Ltd., of Bradford, at the forthcoming **Chelsea** Show and again, since this should provide a great opportunity for publicity, the offer, a most generous one, has been accepted and plans laid to ensure success.

Publicity, in almost every form, takes money and the possible ways and means of raising sufficient money to cover publicity efforts, planned on a very wide scale, are being further considered. W.R.A.

"LONG" BEDS *and* SHORT CROPS

by

W. S. GALBRAITH

Broadly speaking, there are two ways in which the cropping programme of a Mushroom Farm may be arranged. Between the wars, with cheap labour and manure, it was common practice to lay beds 8″ to 12″ (or more) thick, and to pick them more or less to extinction over a period of six months to a year—say 1 to 2 crops per annum. Recent American practice has gone as far as the opposite extreme of 3″ beds picked for about a month. Somewhere between these limits lies the optimum, which will vary with the costs and circumstances of different plants.

The Thin Bed/Quick Crop system seems to be regarded as essentially the prerogative of Two-Zone Tray Plants, and we are accustomed to regard somewhere around 6″ to 8″ beds and 2 to 3 crops per annum as the only possible arrangement with standard shelf plants. In actual fact, there is nothing whatever to stop a grower from availing himself of the more important advantages of Two-Zone, and still have deep beds and long cycles—if he can thereby gain anything. Conversely, there is no reason why he should be tied to a slow turnover on shelves. On my own plant we use Heat Houses and Trays as a routine for pasteurising and spawn running, but we do the actual cropping on the " Long Bed " principle. If any members are interested, and the Editor willing, I could give details of this scheme, but it has no bearing on the present discussion, and it is sufficient to say here that we do this because we dislike the cost of a farm-full of trays when good growing facilities already exist, and, even more dislike the technical and operational snags inherent in boxed-up bed space. Not because Air/Bed ratios worry us; about one half of our production is raised in outdoor frames with an Air/Bed Ratio of ·5 (repeat, POINT 5) to 1, and better and bigger mushrooms are produced than on the other half of the outfit, which is entirely orthodox, yields being similar in both cases, with 2·5 lb./sq. ft. not uncommon on 8″ beds with 6″ air-space. It is simply a matter of adequate air movement ensured by the careful use of natural thermo-dynamics.

The key-stone of Two-Zone economics is the speed-of-yield ratio existing between thin and thick beds, and this can be applied to standard methods of growing also. We all realise in a vague sort of way that thin beds " tend to peter out quickly " and that thick beds " produce more." But *when?* And more *what?*—lb. or £.s.d.? If we are in the business to make a living, surely only the latter really interests us. Dr. Edwards once succintly remarked that nothing was more misleading than to regard a ton of manure as just a Ton of Manure; which is another way of saying that weight means little unless we know what we have weighed. Equally misleading is our long-cherished friend " lb. per sq. ft." —divorced from costs and bed depth, it has no meaning at all.

TABLE 1.

BED DEPTH		WEEKS		Fract. of Full Potential	Yield per Shortened Crop	PER ANNUM			COSTS			INCOME @ nett 2/3d. per lb.	PROFIT p.a. per 1 Ton per crop
		Picking	per Cycle			Crops (1 Ton)	AREA	YIELD	"A" @ £8/Ton	"B" @ 3½d. Sq. Ft.	Total of A & B		
9″	Yield Reduction Factor 1	16	21	—	—	2½	240	480	20 0 0	3 10 0	23 10 0	54 0 0	30 10 0
	Area Increase Factor 1	12	17	4/5	153	3	288	459	24 0 0	4 4 0	28 4 0	51 12 9	23 8 9
	Area per Crop 96 Sq. Ft.	10	15	4/5	153	3½	336	535	28 0 0	4 18 0	32 18 0	60 3 9	27 5 9
	Potential in 16 weeks picking:—	10	15	3/4	144	3½	336	504	28 0 0	4 18 0	32 18 0	56 14 0	23 16 0
	Total 192 lb.	10	15	2/3	128	3½	336	448	28 0 0	4 18 0	32 18 0	50 8 0	17 10 0
	Sq. Ft. 2 lb.												
7″	Yield Reduction Factor 1.2	16	21	—	—	2½	315	535	20 0 0	4 12 0	24 12 0	60 4 0	35 12 0
	Area Increase Factor 1.314	12	17	4/5	171	3	378	513	24 0 0	5 10 3	29 10 3	57 14 3	28 4 0
	Area per Crop 126 Sq. Ft.	12	17	3/4	160	3	378	480	24 0 0	5 10 3	29 10 3	54 0 0	24 9 9
	Potential in 16 weeks picking:—	10	15	4/5	171	3½	441	598	28 0 0	6 8 6	34 8 6	67 5 6	32 17 0
	Total 214 lb.	10	15	3/4	160	3½	441	560	28 0 0	6 8 6	34 8 6	60 6 0	25 17 6
	Sq. Ft. 1.7 lb.	10	15	2/3	142	3½	441	497	28 0 0	6 8 6	34 8 6	55 18 3	21 9 9
5½″	Yield Reduction Factor 1.37	12	17	4/5	178	3	477	534	24 0 0	6 19 1	30 19 1	60 1 0	29 1 11
	Area Increase Factor 1.666	12	17	3/4	166	3	477	498	24 0 0	6 19 1	30 19 1	56 0 6	25 1 5
	Area per Crop 159 Sq. Ft.	10	15	4/5	178	3½	556	623	28 0 0	8 2 2	36 2 2	70 1 9	33 19 7
	Potential in 16 weeks picking:—	10	15	3/4	166	3½	556	583	28 0 0	8 2 2	36 2 2	65 12 0	29 9 10
	Total 222 lb.	10	15	2/3	148	3½	556	518	28 0 0	8 2 2	36 2 2	58 5 0	22 2 10
	Sq. Ft. 1.46 lb.	8	13	4/5	178	4	636	712	32 0 0	9 5 6	41 5 6	80 2 0	38 16 6
		8	13	3/4	166	4	636	664	32 0 0	9 5 6	41 5 6	74 14 0	33 8 6
		8	13	2/3	148	4	636	592	32 0 0	9 5 6	41 5 6	66 12 0	25 6 6
4½″	Yield Reduction Factor 1.6	12	17	4/5	192	3	576	576	24 0 0	8 8 0	32 8 0	64 16 0	32 8 0
	Area Increase Factor 2	12	17	3/4	180	3	576	540	24 0 0	8 8 0	32 8 0	60 15 0	28 7 0
	Area per Crop 192 Sq. Ft.	10	15	4/5	192	3½	672	672	28 0 0	9 16 0	37 16 0	75 12 0	37 16 0
	Potential in 16 weeks picking:—	10	15	3/4	180	3½	672	630	28 0 0	9 16 0	37 16 0	70 17 0	33 1 0
	Total 240 lb.	10	15	2/3	160	3½	672	560	28 0 0	9 16 0	37 16 0	63 0 0	25 4 0
	Sq. Ft. 1.25 lb.	8	13	4/5	192	4	768	768	32 0 0	11 4 0	43 4 0	86 8 0	43 4 0
		8	13	3/4	180	4	768	720	32 0 0	11 4 0	43 4 0	81 0 0	37 16 0
		8	13	2/3	160	4	768	640	32 0 0	11 4 0	43 4 0	72 0 0	28 16 0

Presumably we all study our costs; they are interesting, and often surprising. Dr. Edwards's article on "Costs and Profits" (Bull. No. 30) is highly instructive, and I do not propose to enlarge on it, but to examine an entirely different aspect—the effect of varying bed thickness (and the related cropping cycles) on costs, yields, and hence on profits.

It is a natural and accepted fact that a given quantity of compost can give only a certain maximum yield, irrespective of the thickness at which it is spread; but the *extent* of this POTENTIAL yield, and the time required to get it, is regarded as anybody's guess. Yet we growers cannot afford the luxury of guess-work, and it is possible to remove much of the mystery. With perfect compost cropped under perfect conditions, up to 6 lb./sq. ft. has been obtained in 90 days picking. Presumably more would have been obtained in a longer period, but the potential in average commercial practice is probably about 2 lb./sq. ft. in any reasonably practical cropping period, and on a bed depth of about 8″, which is now regarded as the maximum economic depth. Note that this is the average POTENTIAL of a healthy bed under reasonable conditions—we may well average much less ACTUAL yield, for many reasons. An MGA executive, who probably knows more than most people about average commercial figures, gave me $1\frac{1}{4}$ lb. as about the overall British figure.

It would be natural to suppose that if we make up our beds at half the depth—say 4″—then the anticipated potential would be reduced to 1 lb./sq. ft. Theoretically this might be so if perfect conditions, and complete immunity from disease and pests, could be held for an indefinite period on the *thick* beds, but it does not work out in practice. Any healthy bed produces much more rapidly in the first few weeks of its life than at any later period, and normally gives from 2/3rds to 4/5ths of its total yield in the first eight weeks. By taking a unit weight of compost (say one ton) and bedding it thin, we will find that the consequent exposure of a greater available cropping surface accentuates this tendency, and the thin bed tends to cease cropping effectually sooner (and more suddenly) than a thick one, having produced its potential in a shorter time. But the actual result is not what we might have expected: if the Thick/Thin ratio is, say, 2 to 1 then the Thick/Thin Potential yield is *not* in the same ratio. Just exactly what it is, nobody seems to know, and authentic figures are scarce, but some were supplied by Dr. Lambert in his paper on 2-phase pasteurisation (Bull. No. 33). There is no reason to think that the *ratios* which he gives to show the effect of differing depth of beds are peculiar to the highly specialised technique under which they were produced, although the very high total yields might well have been. Indeed, the proportions are, in general, supported by the reports of tray growers, and the results of many commercial crops grown on my own experimental plant (and *not* on trays) also endorse them, under many varied conditions. The "Yield Reduction Factor" which forms the basis of Table 1 of this article is accordingly based on Dr. Lambert's tables, and the indication is that in the case we have above taken, we might expect from a half-depth bed, picked for 90 days, not 1, but $1\frac{1}{4}$ lb./sq. ft. This would seem to imply the impossible—that, by reducing the thickness of a compost,

we had actually increased its yielding possibilities. This, however, is probably an illusion. The *seeming* extra potential of 1 5th given by the 4" bed could (theoretically) have been obtained also from the 8" bed, but only if the latter were cropped successfully over a much longer period. Its potential of 2 lb. was based on a *reasonable* cropping period, but 2½ lb. would be quite possible from the same compost in, say, 25 weeks, given good health. The point is that extended immunity from disease is rare, and in practice the 2 lb. figure is nearer reality.

The simplest way to see clearly the effect on profits of variations of bed depths and cropping cycles is to split the overall costs into three groups. It is difficult to make the point clear without close reference from now on to the Table. Therein, all the columns to the left of the heavy vertical line are concerned with variations in yields, areas, and cropping cycles, based on four selected bed depths which we have standardised and tested over many crops. All the table figures were arrived at theoretically from these depths, and from Dr. Lambert's ratios, and it is surprising how accurately the " forecasts " have been borne out in practice, barring occasional accidents of the usual sort (" green-feed " manure, for instance, and Cecids). The top line in bold type is taken (quite arbitrarily) as a standard arrangement—9" beds, 2½ crops p.a. and 2 lb. sq.ft. expected in 16 weeks picking, (i.e., the full potential). In all four sections, fractions of the full potential, at 2 3rds, 3 4ths, and 4 5ths, are given to show the effect of crops which fall short of their expected performance. No figures are given for full potential on the two thin bed groups, as we can hardly expect all of a healthy crop to be obtained unless we go beyond 12 weeks.

The columns right of the heavy line are concerned with £.s.d. figures, showing costs, income, and annual profit expectable PER UNIT TON ORIGINAL MANURE X CROPS PER ANNUM. The cost groups are as follows:—

(A) covers only compost costs—everything from the manure purchase to its final dumping out as spent material, including pasteurising, spawn, and all chemicals, etc., used other than in bed maintenance work. In fact, everything directly related to the weight (and therefore, more or less, the bulk) we have handled. Spawn, for instance, is not here related to area, as it generally and incorrectly is, but to volume.

(B) represents only such costs as are directly affected by AREA, irrespective of yield, and these are only casing, and repairs to growing plant, etc.

(C) contains everything else. It is not shown as a table column, but, for simplicity, is lumped into a single sum, and deducted from the expected nett price per lb. of mushrooms sold. A little thought will show this to be the fairest method. In general, the figure will include:—Heat, Light, all picking, packing and bed maintenance time and materials, carriages outwards, sundries and sundry time on maintenance, and the normal " overheads," including Rates, Insurance, Interest on Capital, Office expenses, etc. Nobody could place a definite figure on all these except (perhaps!) for his own plant. Some of them are directly proportional to lb. sold, and none are greatly affected by cropping cycles,

manure quantity or depth, or areas cultivated, except insofar as these latter items determine yield. So if we assume (as we must, to get anywhere) that we can expect a certain yield from a certain set-up, then it follows that our "C" costs are best accounted for as a fixed figure deducted from our selling price. This done, the *relation* of the Table figures (though not their actual amount) will hold good whatever the figure we chose to make "C." In the Table, I have taken 3/6d. (optimistically!) as the nett mean return per lb., and deducted "C" costs at 1/3d. per lb., thus leaving 2/3d. per lb. to cover "A", "B", and profit.

All the rest of the Table is variations on the theme, and the striking possibilites of thin beds are well shown. What the Table does *not* show is:—

(1) The faster cycles may well overstrain the capacity of ones plant, both in labour, heat-house capacity and manure supply.

(2) Thin beds require rather more heat: and more crops p.a. mean more weeks p.a. in which spawn finishing its run in beds may need some extra heating.

(3) A quick and certain spawn run is an essential for success on short cycles. The first pick should be within six weeks of spawning. (Say 2 weeks in Heat House, and 4 in Beds.) The provision of 4 growing rooms in place of 3 plus a Heat House does NOT work well. Peak Heat is slower, more difficult, more destructive to plant, and less effective, and spawn-run tends to be too slow, more especially as it is generally better to use the slower manure spawn instead of Grain in growing-room conditions.

(4) The table will not tell you when to take out a bed—only your own experience and circumstances can do that, taken along with the bed's past history and probable future. But it *will* give you a good clue as to the expectation of useful life from any given bed depth which your manure intake and available space may have given you. Conversely, and more important, it will tell you what bed depth is likely to be your most suitable aim under the particular circumstances of your farm. It will be noticed that there is a considerable degree of flexibility—especially on the thinner beds—with regard to picking time.

CALL-UP DEFERMENT

The Ministry of Labour is having second thoughts about the decision to impose a hard-and-fast rule that young men shall lose their deferment if they change jobs.

An official said: "Because of representations we have received the matter is now being reconsidered. In the meantime, a youngster who is already deferred but who changes his job will be eligible for further deferment.

"Application should be made by the employer in the usual way. Men born before 1933 will also continue to be deferred, but if they change their employer he will have to apply in the usual way, too." *The Grower*, 28.11.53.

MUSHROOM RESEARCH TO CONTINUE

The future of mushroom research is at last assured.

The Directors of the Mushroom Research Association have the greatest pleasure in announcing a successful conclusion to the negotiations with the Ministry of Agriculture and the Governing Body of the new national Glasshouse Crops Research Station at Toddington.

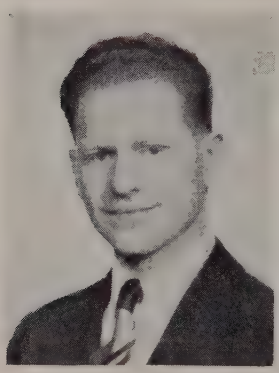
The Ministry of Agriculture has undertaken to find the whole of the money required to maintain the present programme at Yaxley until the end of September, 1954.

The grant of funds by the Ministry for mushroom research work in future will be administered by the Glasshouse Crops Research Station, who have agreed that the facilities at Yaxley shall continue to be used until buildings suitable for mushroom research are erected at Toddington, which will not be possible before the latter end of 1954.

MAC'S MUSHROOM FAMILY

1. Baron Verticillium of Malthouse.

WHO'S WHO



Dr. Leon Russell Kneebone was born in Bangor, Pennsylvania, in 1920. Here he attended the public schools and was graduated from Bangor High School in 1938. He entered Pennsylvania State College in September, 1939, and was awarded the Bachelor of Science degree in December, 1942. The next four years were spent in the airborne troops of the United States Army. After he was honourably discharged as Captain in August, 1946, he was readmitted Penn State as a candidate for the Master of Science degree. A year later he became a candidate for the Doctor of Philosophy degree in Botany.* For three years he served as Graduate Assistant in this department and was awarded the degree of Doctor of Philosophy in August, 1950. He was retained as Assistant Professor of Botany at Penn State effective September, 1950, and has recently been made Associate Professor of Botany with chief responsibility for mushroom research at Pennsylvania State University. Dr. Kneebone is a member of the MGA of Great Britain.

*Dr. James W. Sinden served as chairman of the Faculty Committee which guided his graduate study.

My Favourite Recipes

9.—Ambrose Heath

The Editor has asked me to contribute a note to this Bulletin about my favourite mushroom dishes, and the more I think of it the more difficult it becomes to make a choice. For the delicious fragrance of the mushroom is one that I have learned to love since I first began to cook, a fragrance more pervasive in the kitchen, for sauces, soups, fish or meat dishes and savouries than any other, even the onion. But I suppose he wishes me to write about the dishes in which the mushroom plays the principal part, and that makes things a little easier.

The simpler ones are, of course, the best, and to cook the mushrooms with a little butter and seasoning and nothing more in a closed dish is perhaps the best of all. But grilled mushrooms run this very close, and the dish of my childhood, mushrooms stewed in milk (provided it is rightly done), a very near third. You really want little more than these, to appreciate the true perfume and flavour of this delicious growth, but there are one or two dishes which show it off supremely well and may be unfamiliar to my present readers.

There are two things which, perhaps surprisingly, have a strong affinity with the mushroom flavour; they are olive oil and garlic; and if the combination has not been tried before, these two recipes should be tasted.

Mushrooms Provençale. Slice the mushrooms, through the stalks as well, and put them into a frying-pan with a little olive oil as soon as it is fairly hot but not smoking, and fry them gently for five minutes, turning them once. Then sprinkle them with plenty of chopped parsley mixed with a very little finely minced garlic, salt and pepper, and cook on for another two or three minutes, when they will be done. If garlic is thought to predominate too much here, try another version. Cut the mushrooms in halves, and let them lie for an hour or two in a marinade of olive oil, salt, pepper and a small piece of garlic. When they are wanted, drain them and fry them in the same way in a little hot oil, and when they are cooked, add a few pinches of chopped parsley, a little lemon juice and some small croûtons of fried bread, shake quickly over the heat together, and serve at once.

Cheese, of course, is another thing which goes well with mushrooms, whether you serve them covered with a nicely browned cheese sauce (and don't forget here that garlic does as well with cheese as it does with mushrooms), or as a stuffing for a cheese omelette, or as a small savoury on toast just sprinkled with a little cheese. But I could go on like this for ever, and space will only allow me three more recipes.

Mushrooms à la crème. Melt a couple of ounces of butter in a stewpan, and add your mushrooms, sliced or quartered, with a *bouquet* of parsley, thyme and bay leaf. Toss them on a good heat until they are cooked, then take out the *bouquet* and pour off all but a very little of the butter. Now beat the yolk of an egg with a quarter of a pint of cream

(or very creamy milk), add this to the mushrooms and stir until the cream has thickened, but do not let it boil or it will curdle. Season finally with a little salt, pepper and grated nutmeg, and serve at once with sippets of toast or fried bread.

Mushrooms Viennoise. Button mushrooms should be used for this, and they should first be dusted lightly with very slightly seasoned flour. Then dip them in beaten egg, roll them in fresh breadcrumbs, and fry them in deep fat or oil until the coating is crisp and golden brown. Pile them up in a dish to serve, and hand either a Mayonnaise or Tartare sauce with them.

Mushrooms as Hors d'Œuvre. When I was a young man I used to frequent the Monico Restaurant in London, where there was a most delicious mushroom *hors d'œuvre*. Eventually I begged the recipe from them, and here it is. Peel two pounds of button onions and put them into a stewpan with a quarter of a pint of olive oil, an eighth of a pint of wine vinegar, an ounce of castor sugar, half a pint of tomato purée, the same of white stock, two cloves of garlic, a teaspoonful of peppercorns, a *bouquet* of parsley, thyme and bay leaf and two cloves, the last all tied in a muslin bag. Season to taste with salt and boil all together for twenty minutes. Then add a pound of small peeled and quartered mushrooms, cook on for another ten minutes, and leave to get cold. Before serving remove the garlic and the bag containing *bouquet* and cloves.

THE VENTILATION OF MUSHROOM HOUSES

By **L. GORDON DAVIES, F.Inst.P.I.**
Technical Director of Colt Ventilation Ltd.

When considering the ventilation of a mushroom house, the fact that must always be borne in mind is the reason for ventilation, and this can be summarised by the production of environmental conditions to stimulate growth. Therefore, before studying how to set about the ventilation one must consider the ideal conditions which it is the purpose of the ventilation system to achieve. Once those conditions are known, the ideal solution would be to install a complete air conditioning scheme whose units could reproduce those conditions as required. However, the cost of such a scheme would be prohibitive and good results have been, and can be, achieved by less expensive methods.

To return to the conditions required; during the peak heating period when a temperature of between 125 and 140° F. should be maintained, carbon dioxide is liberated in large quantities. The compost is unaffected by a moderate increase in the proportion of carbon dioxide present, or a decrease in the amount of oxygen present, but

the complete absence of oxygen is, however, harmful to the compost, and should be avoided. A few air changes per day is usually sufficient for this purpose. More would be unnecessary, and if heat from sources other than the heat in the manure is used, this would be wasteful in fuel and expense.

During the spawn run, the temperature should be allowed to drop to between 65 and 75° F. before casing, and between 60 and 65° after casing, the control of relative humidity being less important at this stage so far as the crop is concerned. During the cropping period, the temperature should be in the region of 55—65° F. and the relative humidity between 85 and 90%. These are fairly wide limits, but other considerations enter. It has been found that the lower the temperature, the less prone is the mushroom to disease, but also the growth of the mushroom increases with temperature. The compromise that is struck between the two diverging factors may depend upon other even further considerations. For instance, the structure of the house itself.

The structure of the house, and, in particular, its thermal insulation value plays a very important part in determining the best conditions possible for the mushroom under a scheme of natural ventilation. This is especially so with the problem of condensation within the house itself. As a general rule, condensation is bad for the structure of the house, and if drips are allowed to fall on to the beds themselves, the crop is liable to be harmed.

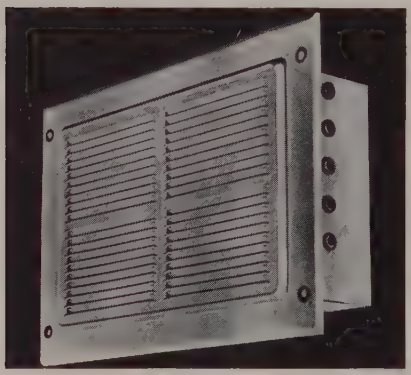
If the house is poorly insulated against heat loss, then on a day with a high relative humidity outside, the temperature inside must be close to the temperature outside if a high internal R.H. is to be maintained without condensation; as an example, if the outside temperature is 45° F. and relative humidity 80%, and the structure is made of, say, R.P.M. sheeting without lining, an inside temperature of 60° F. with a relative humidity of 80% would give rise to condensation. If, by ventilation, the temperature was reduced to 54° F., still with 80% R.H. the condensation would be avoided.

Whilst with the former conditions the condensation would have been avoided by insulating the structure against heat loss, this does not imply that with insulation of the building the need for ventilation disappears. The growing mushroom liberates carbon dioxide and this must not be allowed to accumulate in the house. Whilst figures are lacking concerning the exact emission of carbon dioxide by the mushroom it is stated that a concentration of 1% will retard the growth of the mushroom; a concentration of 5% will completely arrest it. The mushroom itself is far more susceptible to concentrations of this gas than the growing spawn.

Bearing all these considerations in mind, some conception of the type of ventilation required can be formed. Perhaps the first essential is that they should be controllable. This is an obvious necessity in view of the fact that the house must be reasonably sealed at times during the peak heating period, and that during other stages of the growing cycle the ventilation rate must be adjusted according to prevailing outside conditions. An equally important characteristic is that the inlet

ventilators should be draught-proof. This is most important as a mushroom is highly susceptable to draughts and rapid air movement over the mushrooms, even at high humidities will cause them to dry out and crack. Draughts over the bed too should be avoided as they would cause the soil to dry out.

The final consideration should be to provide an adequate quantity of ventilators for the job in hand. As a general rule, the system when fully extended should be able to cope with six air changes per hour, which usually gives sufficient flexibility of control to cope with the vagaries of our climate. In recommending any set number of air changes one is laying oneself open to a certain amount of criticism as conditions in every mushroom house differ. The only way to ventilate successfully is to have a thorough knowledge of all the factors involved in the cultivation of the crop, together with a scheme of ventilation, the controls of which are sufficiently flexible to allow the factors to be obtained in each individual house.



This ventilator is the self-adjusting COLT Constant Flow Ventilator which automatically regulates the speed of incoming air through the ventilator to avoid draught. Colt Ventilation Ltd. of Surbiton make a large variety of ventilators suitable for mushroom houses of which this is one and would in use constitute the less expensive method of ventilation referred to in the opening paragraph of this article. Two sizes are available, one being 9″ × 9″ and the other 11″ × 2′ long.

WORKERS' WAGES

At a special meeting of the Godmanchester branch of the National Union of Agricultural Workers in November a resolution was adopted asking for wages of £7 a week—three months after the minimum wage had been raised to £6.

OFF TO THE STATES

MGA member R. A. DYKE, manager of the Marchioness Townshend's farm of Raynham Hall, left Norfolk in November to take up an appointment with another MGA member, the Michigan Mushroom Company, of Niles, Michigan, U.S.A.

BUILDING LIMIT NOW £25,000

The Minister of Works announced in the House of Commons on Monday that the free limit for 1954 in agricultural building work would be raised to £25,000, to stimulate investment in productive enterprise. This represents a £23,000 increase from the existing limit of £2,000.

FIRST STEPS IN GROWING

by McGregor Bulloch

This series has been specially commissioned. It is intended as a guide solely for the absolute novice. It is being worded as simply as possible, with a view to helping the beginner through that strange world he will encounter when starting along the thorny path of mushroom cultivation.

If any of the explanations seem painfully obvious, the established grower must remember the days when he also was unable to tell the difference between the words "spore" and "spawn," or to know whether mushrooms should or should not be grown in the dark.

There are several excellent books on mushroom growing, and these should be consulted when more advanced information is required.

I—HOW MUSHROOMS GROW

The term "fungi" (pronounced fun-jye, although the singular form fungus is pronounced as spelled) includes moulds, mildews, mushrooms and toadstools of all kinds, and in general their mode of growth follows similar lines, with the exception that the two last-named have large fruiting-bodies, easily visible.

The cultivated mushroom bears many millions of tiny egg-shaped spores on the gills located on the underside of the cap. These spores, too small to be seen individually with the naked eye, are colourless at first, becoming brown when ripe. A small proportion of ripe spores among numerous colourless ones gives the familiar pale mushroom pink, which deepens as the proportion of ripe spores increases, until the gills appear black when the mushroom is fully mature, although the spores themselves are brown.

As they ripen, the spores detach themselves and are borne by air currents to settle over a wide area. To give an idea of the smallness and lightness of a spore, it would take a spore a minute or two to drop from the gills to the ground if no air currents were present.

At this stage it is as well to point out that, in nature, hardly any of the millions of spores released by a mushroom germinate, and that spores released by mushrooms under cultivation cannot under any circumstances give rise to new growths elsewhere on the beds.

When a spore germinates, the inner contents exude at one point through the outer wall in the form of a colourless tube called a hypha (pl. hyphae), which elongates continuously as long as there is a food supply over which it may travel. As the tube extends, branch tubes of

the same size appear at intervals, striking out in all directions, occasionally fusing into other tubes met in their travels. Eventually the compost or medium is completely permeated by the familiar cottony web known as the mycelium. This mycelium, which starts life in the spawn laboratories on a jelly-like medium, is transferred to specially-prepared compost or to wheat and rye grains and continues to grow on these media, when it becomes known respectively as manure and grain spawn.

Mushroom growers buy whichever type of spawn they prefer, and place it in their own prepared composts, in order that the mycelium on the spawn particles may be induced to grow out and invade the entire mass of compost, usually held in shelves or in trays. If the compost is properly prepared, the mycelium runs through it quickly, and eventually penetrates it completely. When the mycelium has grown into the compost sufficiently far, it is necessary, for reasons which will be explained in a later article, for a thin covering of soil or peat, known as the casing, to be laid on the flat surface of the compost. This casing provides a support for the mushrooms which eventually appear, as well as a protection for the compost when watering. Evaporation of water from the casing is thought to induce fruiting, or the production of mushrooms.

At a certain stage, some days after the casing is applied, the mycelium starts to run from the compost into the casing layer, and eventually thickens up as several individual hyphae bunch together side by side to form what are known as rooting strands. Then, when conditions are favourable, minute lumps (nodules or pinheads) form in these strands. These pinheads grow steadily to form button mushrooms, usually in clusters when cropping commences, and later in the life of the beds as single mushrooms.

When a thin section is examined under the microscope, the tissue of the mushroom is seen to consist of countless tubes similar to the hyphae, packed closely side by side. As the small pinheads grow, their food supply is passed up inside the minute threads or hyphae, which act somewhat like the roots of a plant, with the important difference that mushrooms receive their entire food supply through their hyphae, and do not rely on the sun to help in building up these supplies. Plant roots absorb inorganic salts in solution, and the sun and chlorophyll in the leaves act together to convert these into the complex organic foods required. Mushroom hyphae absorb their food through their walls, but enzymes (or chemical agents) in the hyphae are responsible for attacking the constituents of the straw, etc., on which they grow, and for converting them into available food in solution.

This is one reason why mushrooms are usually grown in the dark, and not because darkness is essential to their growth as many people imagine. There are two other simple reasons why specially-constructed mushroom sheds have few if any windows. It is easier and cheaper to omit windows when building, while direct sunlight on the cultivated white mushroom soon produces an undesirable brown tint.

Later in the series, cultural requirements will be described as the

need arises, but by concluding this article with a few words on some of the requirements of the mushroom, the grower-to-be may be induced to start with the right attitude, namely, that mushroom growing is not at all a simple matter.

Mushrooms require nitrogen, potassium and phosphorous as their main foods, together with several inorganic elements such as iron, calcium, copper, in small amounts. Assuming that the compost contains all these things, they have to be fermented to a certain end-point which is ideal for mushroom-growth. The mushroom is a fungus, one of an enormous family, and of the many thousands of species of fungi, some naturally find a well-prepared mushroom compost to be an ideal growing medium and since we are dealing with fungi in both cases, it is extremely difficult to attack the competitor without affecting the mushroom itself. Any deviation from the ideal compost automatically increases the number of competitive fungi which are capable of growing strongly in the resulting unsuccessful compost.

Again, the living mushroom is liable to be attacked by several parasitic moulds and, since these latter require moisture and warmth for optimum development, the grower must keep his sheds cool and not too humid, contrary to the widespread belief that a warm, humid atmosphere is necessary for good mushroom growth. Air is of paramount importance to mushrooms, so that one cannot seal up the sheds to prevent the access of floating disease spores during cropping.

The Resistant Phorid

Sir Thomas Dugdale, Minister of Agriculture, referred in the House of Commons on 3rd December to confusion between the seaweed fly (*Coelopa frigida*) on the South Coast and another type of fly concentrating in mushroom compost (*Megaselia plurispinosa*). The second fly was the dangerous one; it had destroyed or damaged mushroom crops in Kent and Sussex, causing growers heavy financial loss.

According to *The Daily Telegraph* (4.12.53), this phorid fly was difficult to control, even with modern insecticides, because the larvae were already in the prepared compost. So far it was not known that the fly damaged other agricultural crops.

One theory was that the prolonged mild weather might have caused more prolific breeding and movement of swarms over longer distances. Ministry experts were investigating the menace in the Worthing area and parts of Kent. Mushroom growers who had lost whole crops had had to start again.

According to the London *Recorder* (1.12.53), the British mushroom industry has already lost £100,000 through this fly. Kent and Sussex have been particularly hard hit. One Worthing firm of growers had lost £1,500. The grub ate the spawn.

Fred. C. Atkins starts a New Series . . . . . .

THE ATKINS ALPHABET—A

Actinomyces. The actinomyces or ray fungi are widespread in nature. The majority are saprophytic, living on and assisting in the decay of organic residues in the soil. They don't like too much moisture, and thrive in drier conditions. In compost their mycelium is known to us by the frightening term "fire-fang." Secretions from fire-fanged compost have, in the Sarazin laboratories, controlled *Mycogone*.

Achorutus armatum, clad in sober grey, is not generally considered to be as harmful as some of the other springtails, but it's a nuisance.

Activator. That which "activates" the compost, setting the bacteria to work. Sulphate of ammonia, dried blood and poultry droppings are common activators or "boosters" used with strawy manure. Dried blood is the principal activator in the MRA formula for synthetic compost, three cwt. being used for each ton of dry straw; it may one day be replaced by urea, applied at the rate of 84 lb. per ton of straw.

Advice. That which is so often sought and so rarely taken.

Aerosol. A dry mist of minute liquid particles. A useful form in which to distribute fungicides.

Agaricus campestris. The term most commonly used to classify the cultivated mushroom. Treschow's recommendation was *Psalliota bispora* (Lge.) Schaffer & Moller *f. albida* (Lge.) for the cultivated white. At Gembloux in 1953 the preference was for *Psalliota hortensis*. The debate continues.

Air-Conditioning. The mechanical provision of a pre-determined atmosphere. The Dutchmen appeared to lead in the mushroom field in 1952. Apart from initial cost, the main objection is our present ignorance of the exact requirements in the mushroom house.

Alginates. A group of chemicals extracted from seaweed, rather like the fruit pectins in composition and properties, capable of absorbing large volumes of water; they are used for thickening, e.g. in sauces, or for setting jellies, and have been used to make textile fibres for special purposes. Used experimentally as soil conditioners. Quastel & Webley, working on a Rothamsted soil, have found that addition of the sodium salt of alginic acid improved aeration, water-holding power and crumb stability—all properties which are important in casing soils.

Antibiotic. Literally, against life. The mycelium of *Verticillium psalliotæ* exerted a definite antibiotic effect against the mycelia of bubble and brown plaster mould in the MRA laboratories, but unfortunately La Touche was unable to pursue this study.

Arthrobotrys. A species of this mould growing on the casing soil is frequently indicative of the presence of eelworms, on which it is a parasite. This cosh-boy family of moulds specialises in strangulation and a particularly repulsive form of internal penetration.

Ashes. Some growers get improved yields by adding ashes to their casing. Ashes sifted from coal (one part to six parts soil) and weathered ashes sifted from furnace coke (one part to 10 parts soil) have both been recommended.

Editor's footnote: Most of the above appeared in *The Grower* of 30.5.53 and is reproduced with the Editor's permission.

HEATHER FARM WALK

Favoured with surprisingly good weather in view of the time of the year, the farm walk and discussion, organised by the Kent, Surrey and East Sussex Area Committee of the MGA, which took place on Saturday, 28th November, at well-appointed Heather Farm, Horsell Common, Woking, attracted a record number of visitors. Fully 140 people were present to inspect the farm and crops and, of these, no fewer than 120 remained for tea and for the interesting discussion and "Brains Trust" which followed.

At Heather Farm Mr. Clifford King, Principal of Messrs. Heather Farm Ltd., welcomed the company after being introduced by Capt. G. P. Lawrence, Chairman of the MGA, and the Association's Vice-Chairman, Mr. G. W. Baker, who takes such an active part in organising these area meetings in the group concerned.

As befits such an occasion, Capt. Lawrence's speech was brief and to the point. Mr. Baker, too, added his warmth to the general welcome and introduced the Association's Secretary, Mr. Winston Alderton.

Thereafter this large party which, let it be added, had exceeded all expectations in spite of the fact that the invitation was a little more widespread than is customary, split into two groups, being conducted round by Mr. Clifford King and his foreman, Mr. Dennis Nommensen.

Heather Farm is made up of something like fifty thousand square feet of mushroom growing and, of this, all but five or six thousand feet are devoted to growing on the tray system. Thus, it was not surprising that little was seen of the shelves but much of the trays.

Everything was well arranged and ran to a time-table, kept pretty rigidly.

It was first the composting sheds, then the heat room and so to the trays in various stages of production. Round the back then to inspect the heating system and to hear Mr. King extoll the virtues of the heating system in use and thereby give an unsolicited testimonial to Messrs. Burgess, equalled later by another for Handcraft huts. Mr. King, who has been growing mushrooms since 1947, is a man of progress and has two 100 ft. long new Handcraft huts in the course of erection. Naturally he expected some eyebrow raising at this because growers, as a general rule, look a bit askance at buildings of this length but Mr. King was a step ahead of any would-be critics and had his logical explanations for this rather unexpected length.

Horse manure is the composting medium at Heather Farm, and peat is used for casing and it was all natural enough that growers, once back in the composting shed (emporium almost) directed their main questions to Mr. King on his methods of composting, on peat and on labour costs, with an eye on the roller conveyor system in use. Mr. King became the envy of several growers when he said he had a market for his spent compost and it was removed, just as soon as available, quickly and cleanly.

Then came the tea but first a few latecomers for additional tea tickets. Explicit instructions, including map provided, had been given as to the exact route to be followed to the Otter Hotel, Ottershaw, but alas, several, instructions regardless, arrived rather late and abashed at tea, my own rather red face being in good company.

Tea over, the "Brains Trust" took the platform with Mr. A. DeB. Hovell (Church Farm Nurseries) as Question Master. On the platform with him were:—Capt. Lawrence, Mr. G. W. Baker, Mr. G. V. Allen, Mr. H. G. Boxall, Mr. Robt. Darlington, Mr. Clifford King, Mr. Raymond Thompson and Mr. W. A. B. Harding.

From the beginning it was a voyage into the sea of mushroom diseases, a consensus of opinion suggesting there was little difference between white and brown Plaster Mould; there were references to *Dactylium* and *Verticillium*, to Truffle and to *Mycogone*. "Is there any connection between peat and *Mycogone?*" "Yes, I think there is," said Mr. Raymond Thompson but received little or no support at all from his fellow members, with Mr. Hovell rounding it all off with "There doesn't seem much evidence, at the moment, that there is any connection." Mr. Allen, of Bilting, spoke with authority on Truffle for, he said, he'd been overrun with it two or three years before, but, changing from shelves to trays he had culled without hesitation, every tray affected being thrown out as soon as detected and before the Truffle fruited. "Now I have no Truffle whatsoever," he said.

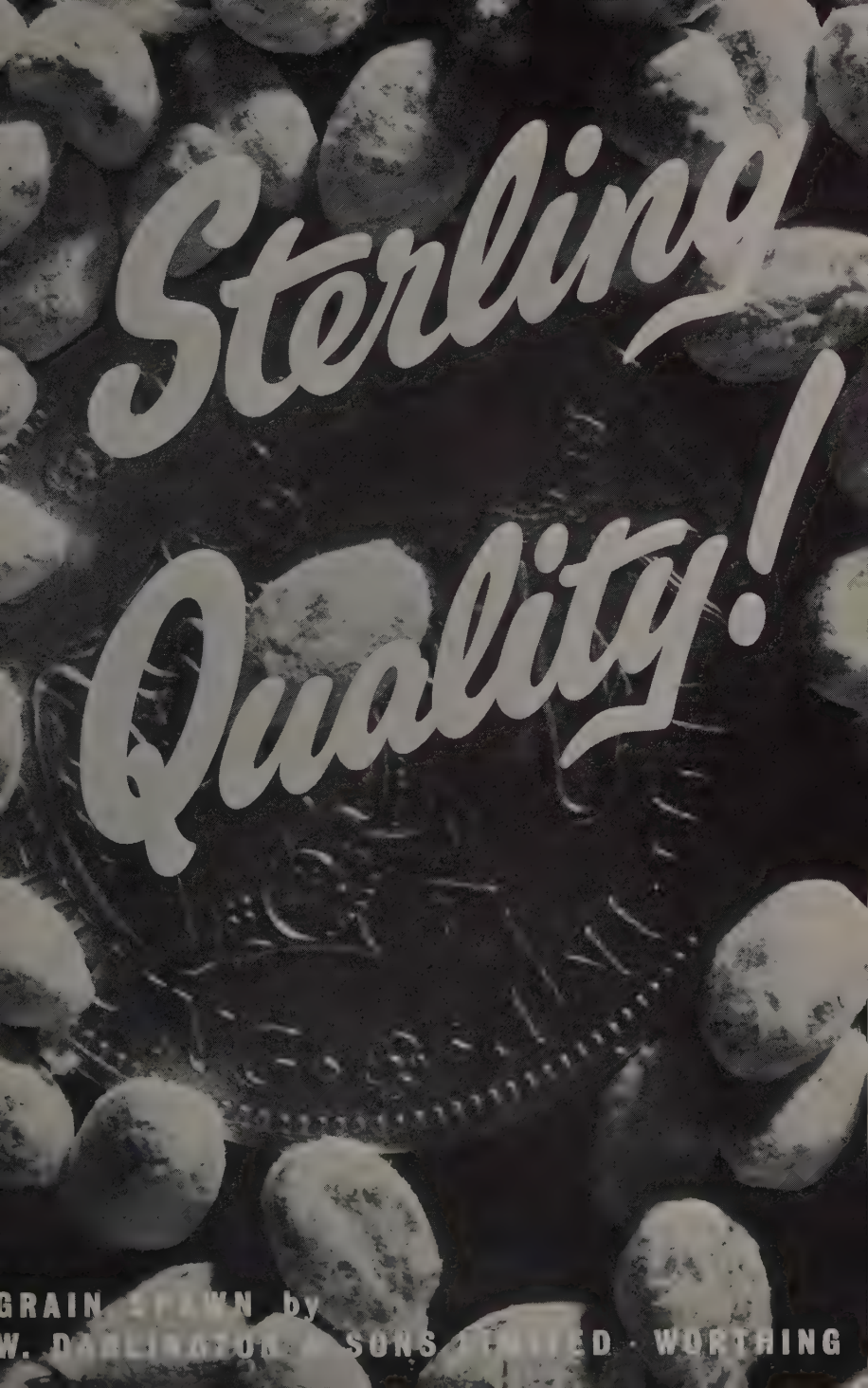
Whereas, for disease remedies, eyes had turned to Mr. Darlington, it was to Mr. Baker that attention turned when the question of larger mushrooms was raised. Mr. Baker simply said that he didn't hurry his growth and was quite content if he didn't pick until eight weeks instead of the usual seven. "Give them time to grow," he said.

There was too a question of synthetic compost but as only one of the "Brains" had tried it, Mr. Bushell, sitting below, had cause to smile a bit.

For me, a newcomer, it was all a revelation and I believe it was, too, for some of the growers!

It was thanks then to the organisers, Messrs. Baker, Harding and Allen and special thanks to the two lady Hon. Secs., Mrs. Baker and Mrs. Jones.

Next area meeting of the group has already been fixed for the first Saturday in March and, by that time, perhaps some of the other groups will be getting under way. W.R.A.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Stanley Middlebrook's Diary

Nov. 12. Short composting contains a minimum time of anaerobic conditions. Can there by any connection between this and the production of small mushrooms? Airless growing conditions are often responsible for such, we know, but do we know the effect on quality of airless (or airy) composting? In fact do we know anything . . . . . ?

Nov. 15. During the Summer and early Autumn we have been free of Dactylium. Now it's starting again, just as it did at the same period last year. It would seem it is linked in some way with artificial heating and a different type of air movement caused thereby.

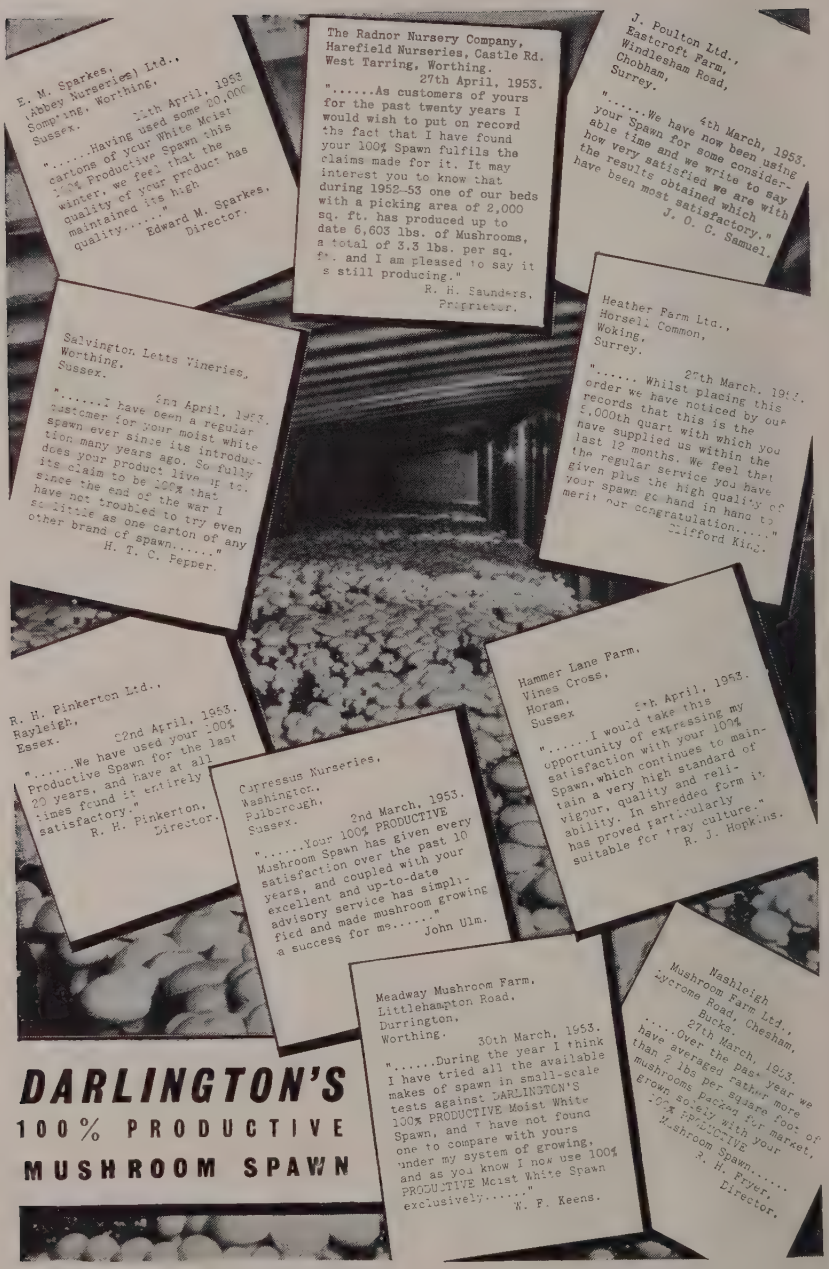
Nov. 17. We are finding quite a few mushrooms which when squeezed emit a fluid strongly resembling a good-bodied red wine in appearance. No one so far has the courage to discover if the resemblance extends to taste, and not unexpectedly no one knows what it is or how it is caused.

Nov. 23. For a particular purpose a certain person collected all my Diary extracts dealing with spawns. Those items were entered over a period of some 18 months and another celebrated person, whose major purpose in life is to discover and enlarge on my mistakes, read them. With deep humility he admitted (in writing too!) " The entries are most interesting and *you don't trip up anywhere*." Why should I? You can usually keep a straight and upright course if you stick to the truth all the time!

Nov. 25. As a result of a continued depression in most market garden products more and more general growers are looking to mushrooms to keep them solvent. This is having its effect on prices which for the last week have averaged 1/- less than the same week last year. As October and November are the high price periods of every year, and as over the last four or five years there has been a general fall from the end of November until the end of the following July it looks as though genuine mushroom growers are in for a difficult time. The newcomers encroaching on our preserves may soon be disillusioned. I hope I'm not being gloomily prophetic when I suggest that before long it may take less and less disease and other trouble to put even the best growers out of business. Heaven help the 1 lb. per sq. footers!

Nov. 26. Of course in the above prophecy I do not include the tray men. They are free from worry. They have seen the red light, and have embarked on a highly progressive, ultra-modern (and therefore foolproof) system of insurance which automatically guarantees unconditional security. They are laughing up their sleeves at us ancients. Their rigid, flawless, inevitable but entirely effortless efficiency enables them to produce at 6d. per lb. (is it?) and ensures that they remain very profitably in business when the rest of us are floored by prices below 2/6d. per lb. With their perpetual motion and their machines working 48 hours per day they can face any depression. Or so they would have us think.

Nov. 30. It would appear that a particular spawn that does us very well on stable manure may not be as good in comparison with others on


E. M. Sparkes,
(Abbey Nurseries) Ltd.,
Somp'ing, Worthing,
Sussex.
"......Having used some 20,000 cartons of your White Moist 100% Productive Spawn this winter, we feel that the quality of your product has maintained its high quality....."
11th April, 1953
Edward M. Sparkes,
Director.
The Radnor Nursery Company,
Harefield Nurseries, Castle Rd.
West Tarring, Worthing.
"......As customers of yours for the past twenty years I would wish to put on record the fact that I have found your 100% Spawn fulfils the claims made for it. It may interest you to know that during 1952-53 one of our beds with a picking area of 2,000 sq. ft. has produced up to date 6,603 lbs. of Mushrooms, a total of 3.3 lbs. per sq. ft. and I am pleased to say it is still producing."
27th April, 1953.
R. H. Saunders,
Proprietor.
J. Poulton Ltd.,
Eastcroft Farm,
Windlesham Road,
Chobham,
Surrey.
"......We have now been using your Spawn for some considerable time and we write to say how very satisfied we are with the results obtained which have been most satisfactory."
4th March, 1953.
J. O. C. Samuel.
Salvington Letts Vineries,
Worthing,
Sussex.
"......I have been a regular customer for your moist white spawn ever since its introduction many years ago. So fully does your product live up to its claim to be 100% that since the end of the war I have not troubled to try even so little as one carton of any other brand of spawn....."
2nd April, 1953.
H. T. C. Pepper.
Heather Farm Ltd.,
Horsell Common,
Woking,
Surrey.
"..... Whilst placing this order we have noticed by our records that this is the 5,000th quart with which you have supplied us within the last 12 months. We feel that the regular service you have given plus the high quality of your spawn go hand in hand to merit our congratulation....."
27th March, 1953.
Clifford King.
R. H. Pinkerton Ltd.,
Rayleigh,
Essex.
"......We have used your 100% Productive Spawn for the last 20 years, and have at all times found it entirely satisfactory."
22nd April, 1953.
R. H. Pinkerton,
Director.
Cypressus Nurseries,
Washington,
Pulborough,
Sussex.
"......Your 100% PRODUCTIVE Mushroom Spawn has given every satisfaction over the past 10 years, and coupled with your excellent and up-to-date advisory service has simplified and made mushroom growing a success for me....."
2nd March, 1953.
John Ulm.
Hammer Lane Farm,
Vines Cross,
Horam,
Sussex
"......I would take this opportunity of expressing my satisfaction with your 100% Spawn, which continues to maintain a very high standard of vigour, quality and reliability. In shredded form it has proved particularly suitable for tray culture."
6th April, 1953.
R. J. Hopkins.
Meadway Mushroom Farm,
Littlehampton Road,
Durrington,
Worthing.
"......During the year I think I have tried all the available makes of spawn in small-scale tests against DARLINGTON'S 100% PRODUCTIVE Moist White Spawn, and I have not found one to compare with yours under my system of growing, and as you know I now use 100% PRODUCTIVE Moist White Spawn exclusively....."
30th March, 1953.
W. F. Keens.
Nashleigh
Mushroom Farm Ltd.,
Lycrome Road, Chesham,
Bucks.
"....Over the past year we have averaged rather more than 2 lbs. per square foot of mushrooms packed for market, grown solely with your 100% PRODUCTIVE Mushroom Spawn....."
27th March, 1953.
H. Fryer,
Director.
DARLINGTON'S
100% PRODUCTIVE
MUSHROOM SPAWN

synthetic compost. We've a lot to learn about this unexplored aspect of our business. In this country we don't know the first thing about the various spawns' requirements. Nor are we expected or encouraged to care.

Dec. 2. " Dear Dr. Edwards. You surprise me. In your otherwise admirable article in the last Bulletin you slip up very badly. That you of all people should be the sleeping partner of the Industry! I quote. . . . . *if synthetic costs nothing it would only reduce the cost of production by 10d. at the outside and for most growers by 5d. or 6d. a lb.* What's wrong with that, you may ask. The word ' only,' of course. One gathers the impression that 6d. a lb. here or 6d. a lb. there is quite unimportant in production costs. With the return of the buyers' market pennies count now, let alone sixpences. We are not unfortunately on a ' cost plus ' basis. Wake up, Dr. Rip Van Edwards, to the depressing realities of 1954 and forget that 1946 ever happened."

Dec. 3. We were a happy group round the bar, discussing the Engineers' strike. Said one to the landlord, " What would be the effect if you fellows went on strike and refused to serve drinks to all and sundry . . . . ?" A wit interrupted him. " You're wrong. That wouldn't be a strike; it'd be a lock-out."

Dec. 4. On the contrary, Mr. Duthy. My polemics constitute an attempt not to deny growers the advantages of increased production but to help them to avoid the irrevocable step which forces them to kid themselves that because they've taken it and become " modern " they *must* be on the right lines. The general use of the tray system, you dogmatize, would put a lot more mushrooms on the market. What do you mean by " a lot "? In 1952 our tray average was 1·465 in three 40 × 18 houses with 4 crops a year, and 1,500 sq. ft. against 1,000 sq. ft. in the same type houses with shelves. Thus 12 crops gave us 26,364 lb. of mushrooms in the year. Do you agree that a steam room of approx. the same size is needed for the three growing rooms? O.K. That's three tray *growing* rooms to four shelf *growing* rooms. Our shelf average for the same period was over 2·2 and 3 crops a year. Thus with 1,000 sq. ft. against 1,500 for trays these four shelf houses produced 26,400 lb. What do you mean by " a lot "? " Steady on, Middlebrook," you say. " You should get 5 crops a year on trays, not 4." True, Sir, but we are well on our way to getting 4 crops a year on shelves and that equals your 5 on trays, all considered. How can we get 4 on shelves? There are some things we keep to ours*h*elves. I do ask you and your fellow tray fellahs (I nearly said travellers!) to PROVE that trays are better than shelves. You all talk and talk and talk, but give no devastating proof. The mystery of tray superiority deepens when we learn that quite a number of you are not even using the much-vaunted extra 50% area per crop. Forsooth, Mr. Duthy, forget the U.S.A. and bring your working party to Yorkshire sometime.

Dec. 8. Tray growers, spawn makers, experts, pundits, learned Doctors, textbook writers and all other offendees (to coin a word) should wait impatiently for next month's Diary which will contain for them all a modicum of interest, much relief, and something to their advantage. " Watch this space."

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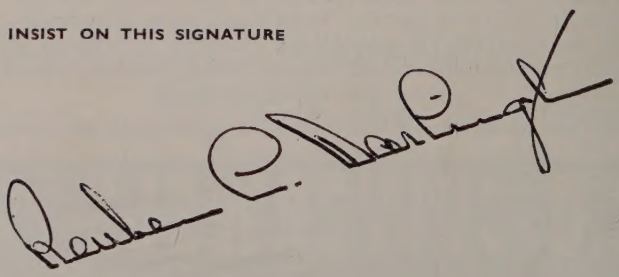

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